Roland®

SOUND EXPANSION

Sound Expansion Series

Owner's Manual

Using This Manual...

This owner's manual is for use with all models in the Sound Expansion Series. It covers virtually all the available functions, and explains how to use them. However, each model in the Sound Expansion Series also provides its own unique features, designed to deliver a great deal more expressiveness and realism within the musical realism that the model is specialized for. Since each model also has its own individual owner's manual, please refer to that manual as well.

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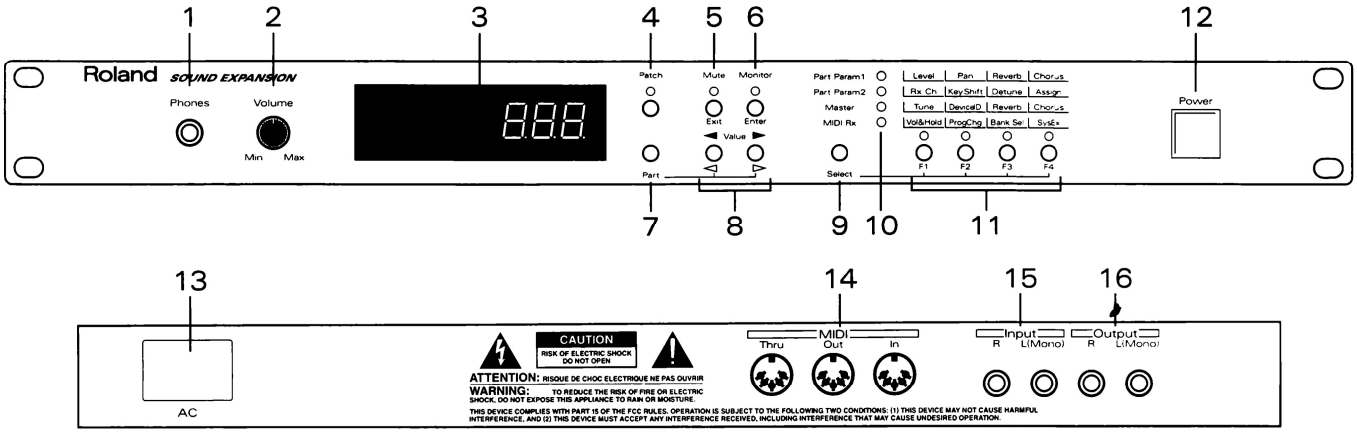
Part Names and Descriptions



1. Phones (headphones) Jack

This is for connecting headphones. Sound still comes out of the Output L/R jacks even when headphones are plugged in.

2. Volume Knob

Used to adjust the volume of the sound output to the Output L/R jacks and the headphones jack.

3. Display

Shows the numbers assigned to Patchs and the values of Parameters. It also displays messages in the event of an error.

4. Patch Button

Patches can be selected by using Value buttons when the indicator for this button is lit up or flashing.

5. Mute Button

To stop the part sounding, press this button and the indicator for this button is lit up.

6. Monitor Button

Parts for which the indicator on this button is lighted are played — all other Parts will be silent.

7. Part Button

To switch Parts, hold down the Part button while you press the Value button.

8. Value Buttons

These buttons are used to change various settings. You can reduce a value rapidly by holding down the ◄ Value button and pressing the ► button. In the same way, you can increase a value rapidly by holding down the ► Value button and pressing the ◄ button.

9. Select Button
10. Select Indicator
11. Function Buttons

These are used to change the settings for this sound module. They are also used to return values to their factory defaults (p. 6). The Select indicator also serves as a level meter for the unit (p. 7).

12. Power Switch

This is used to switch the power on and off. Press the button once to switch the power on, and press it again to return it to its original position and switch the power off.

13. AC Jack

Insert the power cord included with the unit into this jack, and plug the other end into an AC power outlet.

14. MIDI In/MIDI Out/MIDI Thru Connectors

MIDI In: Receives messages from external MIDI devices.
MIDI Out: Transmits messages from the unit to external MIDI devices (Bulk Dump: p. 6).
MIDI Thru: Provides duplicate of the complete MIDI message stream received via MIDI In, without change.

15. Input L/R Jacks

By connecting the output jacks of another sound module to these jacks, you can obtain the mixed output for the two sound modules from the Output L/R jacks and the Phones jack. If you want monaural input, connect the cable to the L jack.
The volume of the sound input to the Input L/R jacks remains constant regardless of the position of this unit's Volume knob.

16. Output L/R jacks

These jacks provide output of the audio signals. If you want monaural output, connect the audio cable to the L jack.

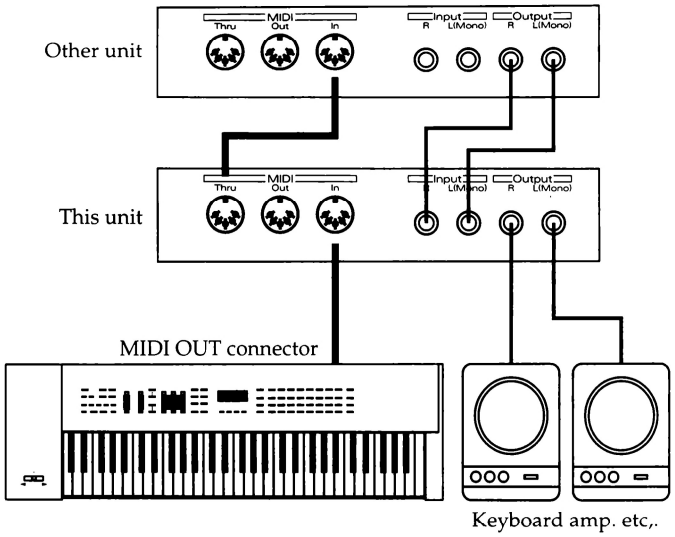
Quick Start

Connections and Power-up

■ Making the Connections .....

First make sure that the power off this unit, and on all other external devices is switched off. Then hook up the unit and the other equipment as shown below.

Use cables with 1/4" phone plugs to connect the unit's Output jacks to a keyboard amp; or to connect the unit's Input jacks with the output jacks on another device. Use MIDI cables to make connections between MIDI connectors.



If you connect the output jacks on another sound module to the unit's Input jacks, you can listen to the sounds output from the two sound modules without using a mixer.

You can listen to the unit even if you have no keyboard amp or audio set. Just plug in headphones to the Phones jack.

■ Before Turning On the Power.....

Before you switch on the power, make sure that the unit's Volume knob is at "Min," and make sure that the volume knobs for the keyboard amp and any other external equipment are also at their lowest settings.

■ Turning On the Power .....

First switch on the power for the unit, and then turn on the keyboard amp or other connected equipment. After you've done that, adjust the unit's Volume knob and the volume controls on the other equipment to get the appropriate sound level.

When switching off the power, first turn off the keyboard amp or other equipment, and then switch off the unit.

* This unit is equipped with a protection circuit. A brief interval (a few seconds) after power up is required before the unit will operate normally.

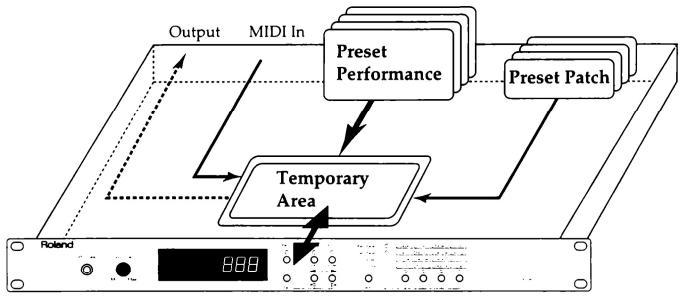
About the Unit's Operation Modes

This unit has a Performance mode and a Patch mode. In the Performance mode, it functions as a multi-timbral sound generator capable of playing eight Parts. In the Patch mode, it works as a sound generator which focuses on playing just a single Part.

The Performance mode can be used for ensemble play with a sequencer, and the Patch mode works well for live-stage performances with a MIDI keyboard hooked up.

About the Temporary Area

When a Performance or Patch is called up, the information for its settings is stored in a temporary area. The only Performances and Patches that you can play with MIDI messages from the MIDI In connector, or can manipulate with the buttons on the front panel are the Performances and Patches that have been read into the temporary area.



You can change the parameters for Performance or Patch that has been called up into the temporary area. You can also change parameters remotely using an external MIDI device connected to the MIDI in connector.

The data in the temporary area is preserved in memory even while the power is off.

Note, however, that if you select another Performance or Patch, settings data in the temporary area before that is discarded.

You can also output the setting values through the MIDI Out connector for storage on an external MIDI device (p. 6).

Try Listening to Sounds in the Performance Mode

This unit has a large number of built-in Performances. A "Performance" is a collection of many settings, including Patches assigned to Parts 1 to 7, Rhythm Set values assigned to Part 8, and the values for Level, Pan, and Effects for each of these Parts.

■ Switching to the Performance Mode.....

You can start up the unit in the Performance mode by switching on the power while holding down the Part button. This setting remains in memory even after the power if switched off.

* The unit is set to the Performance mode when shipped from the factory.

■ Choosing a Performance.....

Hold down the Select button and press the F1 button. "PF" appears on the display. Then the currently selected Performance number appears on the display, as shown below.

While in this state, you can use the Value buttons to choose a Performance. Pressing the Enter button makes it possible to start playing with the selected Performance. To cancel instead, press the Exit button.
For more information on the settings for each Performance, refer to the Performance Chart in the owner's manual for the particular model that you're using.

■ Changing Performance Settings .....

If the MIDI receive channels set for the various Parts don't match the MIDI send channels used by the connected MIDI keyboard, no sound is played.
Try changing the settings for the Patches and Effects assigned to the Parts to modify a Performance to suit your own style of play. Here's how to change these settings.

• Choosing a Part

To switch Parts, hold down the Part button while you press / . The display shows you which Part is selected — for example, "P-1" on the display indicates "Part 1"; and "P-2" means "Part2."
The figure below shows how the display looks when Part 1 has been selected.

• Changing the Patches and Rhythm Set

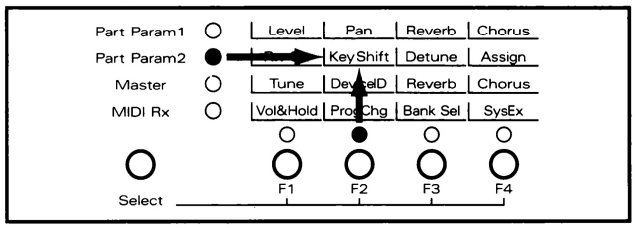
Press the Patch button to make the indicator light up, and then use the Value buttons to choose the desired Patches or Rhythm Set.

* A Rhythm Set can be assigned only to Part 8.

• Changing Parameter Settings

You can make changes to the various Parameters printed on the right-hand side of the unit's front panel.
Choose the Parameter Group with the Select button, and then use the F1, F2, F3, or F4 button to select the Parameter. The lit-up indicator shows you which Parameter has been selected.

In the example below, the Key Shift Parameter is selected.



View the value shown in the display while using the Value buttons to change the value.

■ About the Functions for the Parameters .....

The Parameters that make up Part Param 1, Part Param 2 and a part of MIDI Rx (Vol&Hold, Prog Chg) can be set independently for each Part. The Parameters contained in Master and a part of MIDI Rx (Bank Sel, SysEx) are set commonly for all Parts.
See the Parameter Chart on page 9 for a description of each Parameter's possible range and their default values.

• Part Param 1 (Part Parameter 1)

Level: This adjusts the volume level for each Part.

Pan: Allows you to localize the sound image for each Part. At "0," the sound is centered in the stereo field. Settings of "L1" to "L64" place the sound at positions toward the left, with a larger number indicating a further distance away from the center. In the same way, settings of "r1" to "r63" position the sound to the right, with a larger number indicating a further distance away from the center.

Reverb (Reverb Level): This sets the depth of the Reverb effect (reverberation effect) for each of the Parts.

Chorus (Chorus Level): This sets the depth of the Chorus effect (an effect that makes the sound "fatter") that is applied to each Part.
There are patches that are set the chorus output send to reverb. The chorus level is changed, and the reverb level changes when using the these patches.

• Part Param 2 (Part Parameters 2)

Rx Ch (MIDI Receive Channel): This sets the MIDI receive channel for each Part.

Key Shift: This alters, in half-steps, the pitch at which each Part is played. This pitch is raise (or lowered) by an octave for each setting of +12 (or –12).
This parameter is set to too high or low value, and this unit might not sound or make strange sound in key range.

Detune: This is used to make fine adjustments in the pitch for each Part. The pitch is raised (or lowered) by half a semitone for each setting of +50 (or –50).

Assign (Voice Assign): This assigns a minimum number of voices available for play by a Part. This unit can simultaneously play a maximum of 28 voices. If you are using a sequencer to play complex arrangements, the number of voices available may not be enough, and some notes could be dropped.
If this happens, you may want to assign a number of voices that are required for certain Parts to prevent voices for such important Parts from being stolen, even when the total number of simultaneous notes exceeds 28. Remember, however, that the total number of voices assigned to all Parts together cannot be greater that 28.

• Master Parameters

Tune: This adjusts the pitch that becomes the overall standard for the unit (middle A = A4). This display shows "27.4 Hz" to "52.6 Hz," which represents a value of from 427.4 Hz to 452.6 Hz.

Device ID: The same model ID may be held by other sound modules in this series, or by the JV-80, JV-90, JV-1000, or JV-880. The device ID is information that is used to individually distinguish each device when MIDI devices are used together. If you are using any of the above units at the same time, change the device ID when sending system exclusive (SysEx) messages to them.

Reverb (Reverb Switch): This toggles the reverb effect for the entire unit on or off.

Chorus (Chorus Switch): This toggles the chorus effect for the entire unit on or off.

• MIDI Rx (MIDI Message Reception)

Vol&Hold (Volume/Hold Message Reception Switch): Determines whether Volume and/or Hold messages are to be received or not. The meaning of the settings shown in the display is as follows:

- on — Volume messages and hold messages are both received.
- hLd — Hold messages are received, but volume messages are not.
- voL — Volume messages are received, but hold messages are not.
- oFF — Neither volume messages nor hold messages are received.

Prog Chg (Program Change Message Receive Switch): Allows you to enable/disable reception of Program Change messages. Program Change messages are accepted when "on" is displayed, and ignored when "oFF" is selected.

Bank Sel (Bank Select Message Reception): This changes the unit's Patch, using a Bank Select message (Controller Number 0 or 32) in combination with a Program Change message. When shipped from the factory the Patch can be changed with a Controller Number 0 value of 80 or 81. The display reads "80" at this time. When the display shows "0," Patches can be switched with Controller Number 0 values of 0 and 1. Similarly, Patches can be switched with Controller Number 0 values of 10 and 11 when "10" is shown. You can set this value to any number from 0 to 126. When set to "oFF," no Bank Select messages are received. When the Patch Table set to "2," this parameter cannot be work.

SysEx (System Exclusive Message Receive Switch): This setting determines whether or not system exclusive messages are received. Bulk Dump data is also one type of system exclusive message.

- on — System Exclusive message is received.
- PAr — System Exclusive message other than "GS Reset," "Exit GS," "GM System On," or "GM System Off" is received.
- oFF — System Exclusive message is not received.

■ Muting a Part

Parts for which the Mute button is pressed (the indicator lights) will remain silent.

■ Monitoring a Part

After pressing the Monitor button to light up the indicator, only one Part will be heard at a time, with all other Parts muted out. During ensemble play with a sequencer, it can sometimes be hard to tell how each Part is being played. At such times, you can activate the Monitor button (get its indicator to light) and then switch through the Parts to listen to how each is played.

Try Listening to Sounds in the Patch Mode

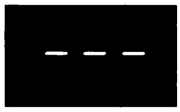
In the Patch mode, the unit functions as a sound generator for just one Part. Reverb and Chorus can be selected for each Patch in this mode, which can give you powerful sounds for live performances.

■ Switch to the Patch Mode

The Patch mode is enabled by switching on the power while holding down the Patch button. This setting remains in memory even after the power is switched off. The indicator for the Patch button flashes when in the Patch mode.

■ Setting Patches

In the same way as for the Performance mode, you can make changes to the various Parameters printed on the right-hand side of the unit's front panel. The functions of the Parameters are no different from the Performance mode — check out "Changing Parameter Settings" (p. 4) for more information.
However, Key Shift, Detune and Assign parameter of the Part Param 2 and Vol&Hold, Prog Chg parameter of the MIDI Rx doesn't work in the Patch mode. When these parameters are selected, "- - -" appears on the display as shown below.



Storing the Unit's Settings

You can transmit the information for the unit's settings from the MIDI Out connector. This function is called a "Bulk Dump." This sends the unit's data to a sequencer or some other MIDI device in real-time for storage on the other device. You can also use this function to return settings stored on another device to the unit.

How to Do a Bulk Dump

Hold down the select button and press the F2 button. "bd" appears on the display. Then use the Value buttons to select the information that you want to send.

- ALL Sends all of the data as well as the Parameter settings for Master and MIDI Rx that can be adjusted from the front panel.
- PF Sends Performance settings and the Parameter settings for Part Param 1 and Part Param 2 that can be adjusted from the front panel.
- Pat Sends the information for Patches assigned to Parts 1 to 7.
- rhy Sends the settings for the Rhythm Set assigned to Part 8.

* The display and operation shown above explain the usage when in the Performance mode. In the Patch mode, the selections "PF" and "rhy" are not available. Also, selecting "Pat" causes the information for only one Patch to be sent.

After starting recording on the sequencer, press the unit's Enter button. The Bulk Dump is executed when you press this button. If you want to cancel the Bulk Dump, press the Exit button.

■ Saving Settings

To save the unit's setting data, connect its MIDI Out connector to the MIDI In connector on a sequencer (or some other MIDI device), and then set the unit's Device ID number (p. 5). When you've done this, start recording on the sequencer and execute a Bulk Dump. After the Bulk Dump has finished, stop recording on the sequencer.

■ Returning Saved Settings to the Unit

To load settings data back into the unit, connect the MIDI Out connector on the sequencer to the unit's MIDI In connector. Make sure that the unit's Device ID number (p. 5) is set to the same number that was used when the settings were save. Also check to make sure that the System Exclusive Message Receive Switch (p. 5) is set to "on."

After you have checked these, send the settings data stored on the sequencer to the unit.

If you record Bulk Dump data at the start of a batch of music data, you can set up the unit simply by sending the song data to the unit.

Returning Settings to Their Factory Defaults (Factory Preset)

This returns all of the unit's settings to the data in effect when the unit was shipped from the factory.

Hold down the Select button and press F3. When the message "FP" flashes on the display, confirm that you want to go ahead by pressing the Enter button. Press the Exit button instead if you change your mind.

NRPN Receive Switch

If you hold down the Select button and press F4, "nrP" flashes on the display. After this disappears, you can use the Value button to select "on" or "oFF." When set to "on," you can use an NRPN (non-registered parameter number) to edit the unit's Patches and Rhythm Sets. This is automatically set to "on" when a GS Reset or GM System On message is received.

When at "oFF," a Patch or Rhythm Set cannot be edited even when an NRPN is received. The setting is always at "oFF" when the power is switched on.

* No GS Reset or GM System On messages are received when the SysEx parameter is set to "oFF" or "PAr."

How to Listen to the Demo Songs

Holding down the Select button as you switch on the power makes it possible to listen to the demo songs. Use the Value buttons to choose a song number. The Demo song is played back when you press the Enter button. Pressing the Exit button stops playback.

Press the Exit button once more, you can play this unit it was.

For more information on the Demo songs, see the owner's manual for the particular model that you're using.

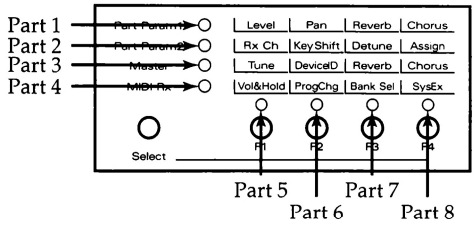
Other Handy Functions

■ Level Meter Function

When the indicator for a Patch button is lit up or flashing, the Select indicator works like a level meter for the unit. It normally indicates the total level for all Patches taken together, but when you're monitoring a Part it indicates only the level for that Part.

■ MIDI Monitor Function

You can display the status of receiving MIDI messages for each Part (Note messages only). If you hold down the Part button, the Select indicator and the indicators for the F1 to F4 buttons will light up while the Part button is held down. The following figure shows the relationship between the Part and the indicators.



Error Messages

noP (No Patch)
Patch not found in the Bank specified by means of Program Change and/or Controller No. 0 & 32 messages.

btL (Battery Low)
The battery required for preserving parameter settings in nearly depleted. Consult with the nearest Roland Service Station.

oFL (MIDI Off Line)
MIDI communications have been disrupted. Consider if the cable connected to MIDI In if faulty, or if there could be a problem with the external device. (The error will appear if the external device has been switched off.)

bFL (MIDI Buffer Full)
Data could not be processed successfully because too much was received within a short period of time.

cSE (MIDI Checksum Error)
A checksum contended in System Exclusive messages received by the unit was found to be in error.

* Should an error other than those explained above (such as Er1, Er2, etc.) appear, you should consult with the nearest Roland Service Center or other authorized service personnel.

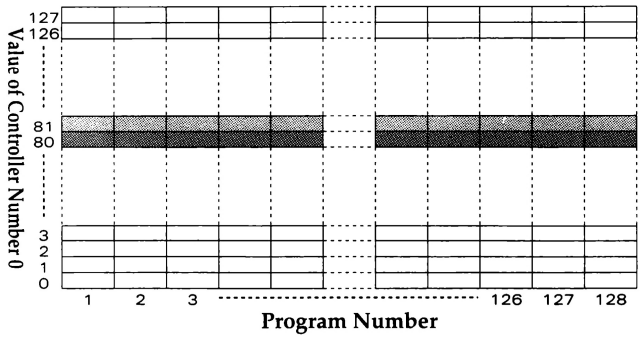
Using MIDI Messages to Control the Unit

This unit can send and receive the MIDI messages indicated by "O" in the MIDI Implementation Chart on page 20. You can use these MIDI message external device. For details, see "MIDI Implementation" (p. 12). Read on for an explanation of some typical functions that you can use.

■ Changing Patches

This unit has more than 128 built-in Patches, so it's not possible to select every Patch with just Program Change messages. For this reason, Patches can be switched by using Program Change messages together with Bank Select messages.
A Bank Select message is a combination of Controller Number 0 and Controller Number 32, but this unit always treats the value of Controller Number 32 as "0" (zero).

When the unit is shipped from the factory, you can select Patches from 1 to 128 with a value of 80 for Controller Number 0 and with the Program Number. You can select Patches from 129 to 255 with a value of 81 for Controller Number 0 and with the Program Number. This is shown in the following figure.



To change a Patch, send MIDI messages from the external device in the sequence shown below.

Controller Number 0
  Value: 80 (Patches 1 to 128)
  Value: 81 (Patches 129 to 256)
Controller Number 32
  Value: 0
Program Number
  Value: 1 to 128

The Patch is changed when the MIDI messages are received in this sequence. If you sent only a Program Number without sending Controller Number 0, the previously sent value for Controller Number 0 and the Program Number just sent are used to choose the Patch.

* When shipped from the factory, the unit is set up for switching patches with a value of 80 or 81 for Controller Number 0, but you can modify the Bank Sel parameter (p. 5) to change the value for Controller Number 0 that is used to switch Patches.
* The number of Patches varies from one model to another.
* If you specify a Bank in which a Patch is not assigned, the message "noP" (no Patch) appears on the display and no sound is played. Press the Value button to return to the previous display. Refer to the owner's manual for the particular model you are using for descriptions of the Patches assigned to the different Banks.

■ Changing Performances

You can also use Program Change messages to change the Performance. When shipped from the factory, however, the unit was set so this feature is disabled. See "MIDI Implementation" (p. 16: Control channel) for more details.

■ Changing the Patch Table

This unit has two Patch Tables. Patch Table 1 (details of which can be found in the owner's manuals for the particular model that you're using) is enabled when the unit's power is switched on, but changes to Patch Table 2 when a General MIDI System On or GS Reset message is received. You can switch back to Patch Table 1 by sending a General MIDI System Off or Exit GS message to the unit; or by switching the power off, then on again.
See the owner's manual for the particular model that you're using for information on the Patch Table 2.

* This unit receives GS reset or GM system on message when it is set to Patch mode, automatically change to Performance mode.

* If SysEx parameter (p.5) set to "oFF" or "PAr," this unit doesn't change to Patch Table 2 because of this unit doesn't receive GM system on and GS reset message.

Important!
When Patch Table 2 has been selected, a dot appears in the lower left corner of the display, as shown below.

Reference

Parameters

• Part Param 1

Parameter	Value
Level	0 — 127
Pan	L64 — 0 — r63
Reverb	0 — 127
Chorus	0 — 127

• Part Param 2

Parameter	Value
Rx Ch	1 — 16
Key Shift	–48 — 0 — +48
Detune	–50 — 0 — +50
Assign	0 — 28

• Master

Parameter	Value
Tune (*)	427.4 — 452.6 Hz
Device ID	1 — 32
Reverb	oFF, on
Chorus	oFF, on

• MIDI Rx Sw

Parameter	Value
Vol&Hold	oFF, voL, hLd, on
Prog Chg	oFF, on
Bank Sel	oFF, 0 — 126
Sys Ex	oFF, PAr, on

(*) The hundreds digit (always 4) is not displayed.

Troubleshooting

If your unit is not providing the expected response, check through the following for a ready solution.

• Power Doesn't Come On

Make sure the power cord is connected properly (both the plug going to this unit and the one at the outlet).

• Sound Not Produced

Recheck that power is indeed switched on — on this unit as well as any other devices (keyboard amp, mixer, etc.).
Could the volume be turned down too low on this unit, or on your keyboard amp, mixer, or other device?
Are all your cable connected properly?
Could any of the cables possibly be faulty?
Check settings for "Level" (p. 4) to make sure they are not at "0."
Could the volume possibly have been lowered by MIDI messages sent to the unit by another device (such as Controller Number 7 or 11)?
Have you checked to make sure that the channel number being used by the keyboard or sequencer for transmission is the same as what this unit is set to be receiving on?
Could you futility be trying to play while a Demo is playing?
Have you checked that relevant Parts are not set to be muted?
Could you be sending an invalid Bank Select message?

• Reverb/Chorus Not Obtained

Could the Master setting for Reverb or Chorus be set to "oFF"?
Are you sure that the Part Param 1 settings for Reverb or Chorus are not set to a value that is too low?

• Distortion or Other Noise Is Heard

Is the volume at a suitable level on this unit, or on your keyboard amp, mixer, or other device?
Could you possibly be using an excessively high level for this unit's Level (p. 4) and Master Level? (These settings are alterable only through System Exclusive messages.)
Have the Output or Phones jacks gotten very dirty?

• Pitch Is Strange

Are the settings for Key Shift (p. 4) and Tune (p. 5) appropriate?
Are Pitch Bend messages being constantly sent to the unit?

• Sound Doesn't Change

Could you have Prog Chg or Bank Sel (p. 5) switched off?
If sending Bank Select messages and/or Program Change message, make sure you are sending them in the correct order.

• Multiple Sounds Heard at the Same Time

Check the channels you have assigned to Parts. The same channel could be assigned to more than one Part.

• Notes Get Dropped

The maximum polyphony of the unit is 28 notes. Not all notes can be played if you attempt to sound more than this at the same time. To avoid having voices stolen from your most important Parts, use the (Voice) Assign setting to reserve a minimum number of voices for those Parts you want to sound.

• Patch Table 2 Not Obtained With GM System On or GS Reset

Make sure the "Sys Ex" setting (a switch for enabling reception of System Exclusive messages) is not set at "oFF."

Roland Exclusive Messages

1. Data Format for Exclusive Messages

Roland's MIDI implementation uses the following data format for all Exclusive messages (type IV):

Byte	Description
F0H	Exclusive Status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
CMD	Command ID
[BODY]	Main data
F7H	End of exclusive

•MIDI status: F0H, F7H

An Exclusive message must be flanked by a pair of status codes, starting with a Manufacturer ID immediately after F0H (MIDI version 1.0).

•Manufacturer ID: 41H

The Manufacturer ID identifies the manufacturer of a MIDI instrument that sends an Exclusive message. Value 41H represents Roland's Manufacturer ID.

•Device ID: DEV

The Device ID contains a unique value that identifies individual devices in the implementation of several MIDI instruments. It is usually set to 00H–0FH, a value smaller by one than that of a basic channel, but value 00H–1FH may be used for a device with several basic channels.

•Model ID: MDL

The Model ID contains a value that identifies one model from another. Different models, however, may share an identical Model ID if they handle similar data.

The Model ID format may contain 00H in one or more places to provide an extended data field. The following are examples of valid Model IDs, each representing a unique model:

01H
02H
03H
00H, 01H
00H, 02H
00H, 00H, 01H

•Command ID: CMD

The Command ID indicates the function of an Exclusive message. The Command ID format may contain 00H in one or more places to provide an extended data field. The following are examples of valid Command IDs, each representing a unique function:

01H
02H
03H
00H, 01H
00H, 02H
00H, 00H, 01H

•Main data: BODY

This field contains a message to be exchanged across an interface. The exact data size and content will vary with the Model ID and Command ID.

2. Address-mapped Data Transfer

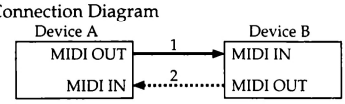
Address mapping is a technique for transferring messages conforming to the data format given in Section 1. It assigns a series of memory-resident records—waveform and tone data, switch status, and parameters, for example, to specific locations in a machine-dependent address space, thereby allowing access to data residing at the address a message specifies.

Address-mapped data transfer is therefore independent of models and data categories. This technique allows use of two different transfer procedures: one-way transfer and handshake transfer.

•One-way transfer procedure (See Section 3 for details.)

This procedure is suited to the transfer of a small amount of data. It sends out an Exclusive message completely independent of the receiving device's status.

Connection Diagram

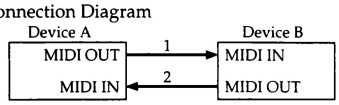


Connection at point 2 is essential for "Request data" procedures. (See Section 3.)

•Handshake-transfer procedure (This device does not use this procedure)

This procedure initiates a predetermined transfer sequence (handshaking) across the interface before data transfer takes place. Handshaking ensures that reliability and transfer speed are high enough to handle a large amount of data.

Connection Diagram



Connection at points 1 and 2 is essential.

Notes on the above procedures

* There are separate Command IDs for different transfer procedures.

* Devices A and B cannot exchange data unless they use the same transfer procedure, share identical Device ID and Model ID, and are ready for communication.

3. One-way Transfer Procedure

This procedure sends out data until it has all been sent and is used when the messages are so short that answerbacks need not be checked.
For longer messages, however, the receiving device must acquire each message in time with the transfer sequence, which inserts 20 milliseconds intervals.

Types of Messages

Message	Command ID
Request data 1	RQ1 (11H)
Data set 1	DT1 (12H)

•Request data #1: RQ1 (11H)

This message is sent out when there is a need to acquire data from a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of data required.
On receiving an RQ1 message, the remote device checks its memory for the data address and size that satisfy the request.
If it finds them and is ready for communication, the device will transmit a "Data set 1 (DT1)" message, which contains the requested data. Otherwise, the device won't send out anything.

Byte	Description
F0H	Exclusive Status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
11H	Command ID
aaH	Address MSB
I	I
I	I
	LSB
ssH	Size MSB
I	I
I	I
	LSB
sum	Check sum
F7H	End of exclusive

* The size of the requested data does not indicate the number of bytes that will make up a DT1 message, but represents the address fields where the requested data resides.

* Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.

* The same number of bytes comprises address and size data, which, however, vary with the Model ID.

* The error-checking process uses a checksum that provides a bit pattern where the last 7 bits are zero when values for an address, size, and that checksum are summed.

•Data set 1: DT1 (12H)

This message corresponds to the actual data transfer process.
Because every byte in the data is assigned a unique address, a DT1 message can convey the starting address of one or more bits of data as well as a series of data formatted in an address-dependent order.

The MIDI standards inhibit non real-time messages from interrupting an Exclusive one. This fact is inconvenient for devices that support a "soft-thru" function. To maintain compatibility with such devices, Roland has limited the DT1 to 256 bytes so that an excessively long message is sent out in separate 'segments'.

Byte	Description
F0H	Exclusive Status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
12H	Command ID
aaH	Address MSB
I	I
I	I
	LSB
ddH	Data MSB
I	I
I	I
	LSB
sum	Check sum
F7H	End of exclusive

* A DT1 message is capable of providing only the valid data among those specified by an RQ1 message.

* Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.

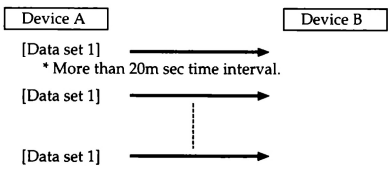
* The number of bytes comprising address data varies from one Model ID to another.

* The error-checking process uses a checksum that provides a bit pattern where the last 7 bits are zero when values for an address, size, and that checksum are summed.

•Example of Message Transactions

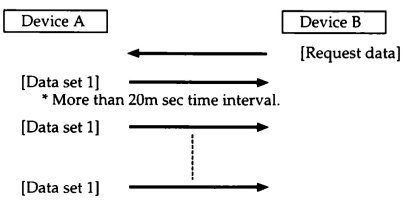
•Device A sending data to Device B

Transfer of a DT1 message is all that takes place.



•Device B requesting data from Device A

Device B sends an RQ1 message to Device A.
Checking the message, Device A sends a DT1 message back to Device B.



1. RECEIVE DATA

Channel Voice Message

• Note Off

Status	Second	Third
8nH	kkH	vvH
9nH	kkH	00H

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
kk = Note number: 00H — 7FH (0 — 127)
vv = velocity: 00H — 7FH (0 — 127)

In the performance mode, ignored when the "MIDI receive switch" is OFF for each part.
In the rhythm part (part 8), ignored when "ENV mode" is at "NO-SUSTAIN" for each rhythm tone.

• Note On

Status	Second	Third
9nH	kkH	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
kk = Note number: 00H — 7FH (0 — 127)
vv = velocity: 01H — 7FH (1 — 127)

In the performance mode, ignored when the "MIDI receive switch" is OFF for each part.

Control change

• Bank select

Status	Second	Third
BnH	00H	mmH
BnH	20H	llH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
mm = MSB of the bank number: 50H — 51H (80 — 81)
"mm" is adjustable from 0,1 to 126,127.
ll = LSB of the bank number: 0H (0)

The Bank Select is suspended until receiving a program change.
This message is ignored when "Program bank sel" of the system common is OFF.
If the part which MIDI receive channel is set the same as the control channel, the performance is changed when receive the bank select message.

The bank number specified as following.

Bank select

MSB	LSB	Program change	Media (Patch number)
80	0	1 — 128	Preset A (#1 — #128)
81	0	1 — 127	Preset B (#129 — #255)

When the module receives bank select LSB, it will always count as 0.

• Modulation

Status	Second	Third
BnH	01H	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Modulation depth: 00H — 7FH (0 — 127)

The effect of the modulation depends on the value of "Mod1 — 4" of the patch tone.
This message is ignored when "Receive Modulation" of the system common is OFF.

• Portamento time

Status	Second	Third
BnH	05H	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Portamento time: 00H — 7FH (0 — 127)

You can adjust the portamento time of the patch common.
This message is ignored when "Receive Control change" of the system common is OFF.

• Volume

Status	Second	Third
BnH	07H	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Volume: 00H — 7FH (0 — 127)

You can adjust the volume of specified channel.
This message is ignored when "Receive volume" of the system common is OFF.
In the performance mode, ignored when the "Receive volume switch" is OFF for each part.
This message is ignored when "Volume switch" of the patch tone is OFF.

• Pan

Status	Second	Third
BnH	0AH	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Pan: 00H — 7FH (0 — 127)

0 represents the left end, 64 the center, and 127 the right end.
This message is ignored when "Receive Control Change" of the system common is OFF.

• Expression

Status	Second	Third
BnH	0BH	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Expression: 00H — 7FH (0 — 127)

The effect of the expression depends on the value of "Exp1 — 4" of the patch tone.
This message is ignored when "Receive Control Change" of the system common is OFF.

• Hold 1

Status	Second	Third
BnH	40H	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Control value: 00H — 7FH (0 — 127) 0 — 63 = OFF, 64 — 127 = ON

Note played can be sustained for as long as the time that elapses between turning hold on and off.
This message is ignored when "Receive Control Change" of the system common is OFF.
In the performance mode, ignored when the "hold1 receive switch" is OFF for each part.
In the rhythm part (part8), ignored when "ENV mode" is at "NO-SUSTAIN" for each rhythm tone.
This message is ignored when "Hold-1 switch" of patch tone is OFF.

• Portamento

Status	Second	Third
BnH	41H	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Control value: 00H — 7FH (0 — 127) 0 — 63 = OFF, 64 — 127 = ON

Switches over "Portamento sw" of patch common.
This message is ignored when "Receive control change" of the system common is OFF.

• Sostenuto

Status	Second	Third
BnH	42H	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Control value: 00H — 7FH (0 — 127) 0 — 63 = OFF, 64 — 127 = ON

• Soft

Status	Second	Third
BnH	43H	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Control value: 00H — 7FH (0 — 127)

The value is changed, and the "Soft" effect change.

• Effect 1 depth (Reverb send level)

Status	Second	Third
BnH	5BH	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = Control value: 00H — 7FH (0 — 127)

You can adjust the Reverb send level of specified channel.
This message is ignored when "Receive control change" of the system common is OFF.

• Effect 3 depth (Chorus send level)

Status	Second	Third
BnH	5DH	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = control value: 00H — 7FH (0 — 127)

You can adjust the Chorus send level of specified channel.
This message is ignored when "Receive control change" of the system common is OFF.

• NRPN MSB/LSB

Status	Second	Third
BnH	63H	mmH
BnH	62H	llH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
mm = MSB of the specified parameter by NRPN
ll = LSB of the specified parameter by NRPN

When the power is turned on, or "General MIDI System On" is received, Rx.NRPN will be set OFF, and NRPN will not be received.
When "GS reset" or Rx.NRPN = ON is received,NRPN can be received.
The value set by NRPN will not be reset even if Program change or Reset all controller is received.

** NRPN **

The NRPN (Non Registered Parameter number) message allows an extended range of control changes to be used, letting you use control messages which are not part of the MIDI Specification and may be unique to an individual model. To use these messages, you must first use NRPN MSB and NRPN LSB message to specify the parameter to be controlled, and then use Data Entry messages to specify the value of the specified parameter. Once an NRPN parameter has been specified, all Data Entry messages received on that channel will modify the value of that parameter. To prevent accidents, it is recommended that you set RPN Null (RPN Number = 7FH/7FH) when you have finished setting the value of the desired parameter.

On This module, the following NRPN can be received.

NRPN MSB LSB	Data entry MSB	Function and range
01H 08H	mmH	Vibrato Rate (relative change) mm: 0EH — 40H — 72H (–50 — 0 — +50)
01H 09H	mmH	Vibrato Depth (relative change) mm: 0EH — 40H — 72H (–50 — 0 — +50)
01H 0AH	mmH	Vibrato Delay (relative change) mm: 0EH — 40H — 72H (–50 — 0 — +50)
01H 20H	mmH	TVF Cutoff Frequency (relative change) mm: 0EH — 40H — 72H (–50 — 0 — +50)
01H 21H	mmH	TVF Resonance (relative chenge) mm: 0EH — 40H — 72H (–50 — 0 — +50)
01H 63H	mmH	TVF&TVA Envelope Attack Time (relative change) mm: 0EH — 40H — 72H (–50 — 0 — +50)
01H 64H	mmH	TVF&TVA Envelope Decay Time (relative change) mm: 0EH — 40H — 72H (–50 — 0 — +50)
01H 66H	mmH	TVF&TVA Envelope release Time (relative change) mm: 0EH — 40H — 72H (–50 — 0 — +50)
18H rrH	mmH	Rhythm Instrument Pitch Coarse (relative change) rr: Rhythm Instrument note number mm: 00H — 40H — 7FH (–64 — 0 — +63 semitone)
1AH rrH	mmH	Rhythm Instrument TVA level (absolute change) rr: Rhythm Instrument note number mm: 00H — 7FH (0 — max)
1CH rrH	mmH	Rhythm Instrument Panpot (absolute change) rr: Rhythm Instrument note number mm: 00H, 01H — 40H — 7FH (random, left-center-right)
1DH rrH	mmH	Rhythm instrument Reverb Send Level (absolute change) rr: Rhythm Instrument note number mm: 00H — 7FH (0 — max)
1EH rrH	mmH	Rhythm Instrument Chorus Send Level (absolute change) rr: Rhythm Instrument note number mm: 00H — 7FH (0 — max)

Data entry LSB (llH) is ignored
Parameters marked "relative change" change relative to the preset value (40H). Even among different GS devices, "relative change" parameters may sometimes differ in the way the sound changes or in the range of change.
Parameters marked "absolute change" will be set to the absolute value of the parameter, regardless of the preset value.

• RPN MSB/LSB

Status	Second	Third
BnH	65H	mmH
BnH	64H	llH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
mm = MSB of the specified parameter by RPN
ll = LSB of the specified parameter by RPN

** RPN **

RPN (registered parameter number) is a parameter number of tone color or musical expression defined in MIDI specification.
With the Sound Expansion Series as the receiver,RPN#0 (pitch bend sensitivity), RPN#1 (fine tuning) and RPN#2 (coarse tuning) are effective. when sending an RPN to the Sound Expansion Series,first specify the MSB and LSB of the RPN to be used to control a parameter and then set the value in the data entry field.

RPN MSB LSB	Data entry MSB LSB	Description
00H 00H	mmH —	Pitch bend sensitivity mm: 00H — 0CH (0 — 12 semitone) ll: Ignored Up to 1 octave You can adjust "BENDER — RANGE DOWN" and "BENDER — RANGE UP" at same time. In the rhythm part (part8), this message is not recognized.
00H 01H	mmH llH	Fine tuning mm, ll: 20H, 00H — 40H, 00H — 60H, 00H (–8192 x 50 / 8192 — 0 — +8192 x 50 / 8192 cent) In the patch mode, the master tune is adjusted. In the performance mode, fine tune at each part is adjusted. In the performance mode, when received as specified control channel, the master tune is adjusted.
00H 02H	mmH —	Coarse tuning mm: 10H — 40H — 70H (–48 — 0 — +48 semitone) ll: Ignored In the patch mode, this message is not recognized. In the performance mode, coarse tune for each part is adjusted .
7FH 7FH	— —	RPN reset mm, ll: Ignored It returns to the state where no RPN parameters are specified. Current setting value is no change.

• Data entry MSB/LSB

Status	Second	Third
BnH	06H	mmH
BnH	26H	llH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
mm = MSB of the value of the parameter specified with RPN
ll = LSB of the value of the parameter specified with RPN

This message is ignored when "Receive control change" of the system common is OFF.

• Program Change

Status	Second
CnH	ppH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
pp = Program number: 00H — 7FH (prog.1 — prog.128)

This message is ignored when "Receive program change" of the system common is OFF.
If the part which MIDI receive channel is set the same as the control channel, the performance is changed when receive the program change message.

• Channel pressure

Status	Second
DnH	vvH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
vv = value: 00H — 7FH (0 — 127)

The effect of the Channel pressure depends on the value of "After 1 — 4" of the patch tone.
This message is ignored when "Receive Channel pressure" of the System common is OFF.

• Pitch bend change

Status	Second	Third
EnH	llH	mmH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
mm, ll = value: 00H, 00H — 7FH, 7FH (–8192 — +8191)

This message is ignored when " Receive Pitch bend " of the system common is OFF.

Channel Mode Message

• All Sound Off

Status	Second	Third
BnH	78H	00H

n = MIDI channel number: 0H — FH (ch.1 — ch.16)

When this message is received, all currently-sounding notes on this corresponding channel will be turned off immediately.
This message is ignored when the "MIDI receive switch" is OFF for each part.

• Reset All Controllers

Status	Second	Third
BnH	79H	00H

n = MIDI channel number: 0H — FH (ch.1 — ch.16)

If this message is received, the values of following controllers will be changed.

Controller	Value
Modulation	0 (off)
Volume	127 (maximum)
Panpot	64 (center)
Expression	0 (off)
Hold 1	0 (off)
Channel pressure	0 (off)
Pitch bend change	0 (center)
RPN	No specified parameter, no value is changed.
NRPN	No specified parameter, no value is changed.

• All note off

Status	Second	Third
BnH	7BH	00H

n = MIDI channel number: 0H — FH (ch.1 — ch.16)

When this message is recognized, all the note which have been turned on by "MIDI note on" message are turned off.
However if Hold 1 or Sostenuto is on, the sound will be continued untill these are turned off.

• OMNI Off

Status	Second	Third
BnH	7CH	00H

n = MIDI channel number: 0H — FH (ch.1 — ch.16)

Recognized as "All note off".

• OMNI On

Status	Second	Third
BnH	7DH	00H

n = MIDI channel number: 0H — FH (ch.1 — ch.16)

This message is recognized as "All note off". (Sound Expansion Series doesn't recognize OMNI on.)

• MONO

Status	Second	Third
BnH	7EH	mmH

n = MIDI channel number: 0H — FH (ch.1 — ch.16)
mm = number of mono: 00H — 10H (0 — 16)

"Assign mode" of patch common is Switched to "SOLO."
Recognize as "All notes off", and sets each patch MODE4 (M = 1).

• POLY

Status	Second	Third
BnH	7FH	00H

n = MIDI channel number :0H — FH (ch.1 — ch.16)
Switched over "Assign mode" of patch common.
Recognized all notes off, and set MODE3 at each patch.

System Realtime message

• Active sensing

Status
FEH

When Sound Expansion Series receives an "Active sensing," it measures time intervals between incoming messages. If the subsequent message does not come within 350 ms after the previous one, Sound Expansion Series will turn off all MIDI - on notes as if it received "Reset all controllers," stop measuring message interval.

• System Exclusive message

status	data bytes
F0H	iiH, ddH,.....,eeH
F7H	

F0H System exclusive
ii = manufacturer ID :41H (65)
dd, ..., ee = data: 00H — 7FH (0 — 127)
F7H: EOX (End of Exclusive/System common)

System exclusive message is ignored when "Receive Exclusive" of the system common is OFF.
Refer to section 3,4

System Exclusive Message for setting the Modes

"Data set 1 (DT1)", the Roland's Exclusive format, is used for "GS reset" and "Exit GS Mode." The "Universal non-realtime message" format is used for "General MIDI system on" and "General MIDI system off."

• General MIDI system on

This model will be in an operational mode of "Patch Table 2" when receiving this message.

Status	Data byte	Status
F0H	7EH, 7FH, 09H, 01H	F7H

Byte	Description
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (General MIDI Message)
01H	Sub ID#2 (General MIDI On)
F7H	EOX (End Of Exclusive)

When this message is received, Rx.BANK SELECT will be OFF and Rx.NRPN will be OFF.
This message will not be received when "Exclusive" parameter of "MIDI Rx Sw" group = OFF.
Make an interval of 50ms or more, before receiving the next message.

• General MIDI system off

This model will be in an operational mode of "Patch Table 1" when receiving this message.

Status	Data byte	Status
F0H	7EH, 7FH, 09H, 02H	F7H

Byte	Description
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (General MIDI Message)
02H	Sub ID#2 (General MIDI On)
F7H	EOX (End Of Exclusive)

This message will not be received when "SysEx" parameter of "MIDI Rx Sw" group = OFF.
Make an interval of 50ms or more, before receiving the next message.

• GS reset

This model will be in an operational mode of "Patch Table 2" when receiving this message.

Status	Data byte	Status
F0H	41H, dev, 42H, 12H, 40H, 00H, 7FH, 00H, 41H	F7H

Byte	Description
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H — 1FH (1 — 32), Initial value is 10H (17))
42H	Model ID (GS)
12H	Command ID (DT1)
40H	address MSB
00H	address
7FH	address LSB
00H	data (GS reset)
41H	Check sum
F7H	EOX (End Of Exclusive)

When this message is received, Rx.NRPN will set ON.
This message will not be received when "SysEx" parameter of "MIDI Rx Sw" group = OFF.
Make an interval of 50ms or more, before receiving the next message.

• Exit GS mode

This model will be in an operational mode of "Patch Table 1" when receiving this message.

Status	Data byte	Status
F0H	41H, dev, 42H, 12H, 40H, 00H, 7FH, 7FH, 42H	F7H

Byte	Description
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H — 1FH (1 — 32), Initial value is 10H (17))
42H	Model ID (GS)
12H	Command ID (DT1)
40H	Address MSB
00H	Address
7FH	Address LSB
7FH	Data (Exit GS mode)
42H	Check sum
F7H	EOX (End Of Exclusive)

This message will not be received when "Exclusive" parameter of "MIDI Rx Sw" group = OFF.
Make an interval of 50ms or more, before receiving the next message.

2. TRANSMIT DATA

System realtime

• Active sensing

status
FEH

This message is transmitted with 250 milli seconds interval.

• System exclusive message

status	data bytes
F0H	iiH,ddH,.....,eeH
F7H	

F0H: System exclusive
ii = manufacturer ID: 41H (65)
dd, ..., ee = Data: 00H — 7FH (0 — 127)
F7H: EOX (End of Exclusive/System common)

Refer to section 3,4.

3. Exclusive communications

The Sound Expansion Series can send and receive patch parameter, etc using the system exclusive message.
The model ID code of the Sound Expansion Series is 46H. The device ID code is to be determined by the "Device ID" setting of Master.

The Sound Expansion Series ignores GS exclusive message other than "GS reset," "Exit GS mode" and "Scale tune parameter," General MIDI system on, General MIDI system off, GS reset and Exit GS.
The model ID of the GS is 42H.

One way communication.

• Request data 1 RQ1 (11H)

Bytes	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
Dev	Device ID
46H	Model ID (Sound Expansion Series)
11H	Command ID (RQ 1)
aaH	Address MSB
bbH	Address
ccH	Address
ddH	Address LSB
ssH	Size MSB
ttH	Size
uuH	Size
vvH	Size LSB
sum	Check sum
F7H	EOX (End of exclusive)

Receive only: the Sound Expansion Series does not send this message.

Data set 1 DT1 (12H)

• 1. Sound Expansion Series (MODEL ID = 46H)

Bytes	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
Dev	Device ID
46H	Model ID
12H	Command ID (DT 1)
aaH	Address MSB
bbH	Address
ccH	Address
ddH	Address LSB
eeH	Data
:	:
ffH	Data
sum	Check sum
F7H	EOX (End of exclusive)

2. GS (MODEL ID = 42H)

Bytes	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
Dev	Device ID
42H	Model ID (GS)
12H	Command ID (DT!)
aaH	Address MSB
bbH	Address
ccH	Address
eeH	Data
:	:
ffH	Data
sum	Check sum
F7H	EOX (End of Exclusive)

Note: When the device ID is 7FH, Sound Expansion Series can receive the exclusive message even if the unit number is anything.

• Parameter address map

Address and size are configured in 7 bits, hexadecimal notation.

Address	MSB		LSB	
Binary	0aaa aaaa	0bbb bbbb	0ccc cccc	0ddd dddd
7-bits hex	AA	BB	CC	DD

Size	MSB		LSB	
Binary	0sss ssss	0ttt tttt	0uuu uuuu	0vvv vvvv
7-bits hex	SS	TT	UU	VV

• Parameter base address

1) A pair of two addresses preceded by the symbol # represents a divided — by -two data. e.g.the data ABH (hex) is divided into 0AH and 0BH and sent in that order.
2) Parameter associated with address following the symbol % are for Sound Expansion Series

• Example of exclusive data

Data Set 1 (1 byte data)
To Select Pan-Delay for the Reverb Type.
F0 41 10 46 12 00 00 10 0D 07 5C F7

Note that the 5th byte value is 12H in order to "Set" the data.
Send the data (07 for Pan-Delay) with the address (00 00 01 0D for reverb type) of the "Performance common" parameter.

Data set 1 (2 byte data)
To Select Wave Number 141 for Patch Tone 1 in Part 1.
F0 41 10 46 12 00 00 28 01 08 0C 43 F7

The Address for Patch Tone 1 in Part 1 is 00 00 28 01.
If you want to send 140 as a data, first you need to change it to hex-decimal notation which is 8C.
Then divide this in 2 byte, which is called "nibblizing" , and send 08 0C as data.

Request Data
Make the module to send the chorus level.
F0 41 10 46 11 00 00 10 12 00 00 00 01 5D F7

Note that the 5th byte value is 11H, in order to "Request" the data.
Send 00 00 10 12 as an Address for Chorus Level and 00 00 00 01 as "Size of the data" for it, which is 1 byte.
When the module receives this data, it will automatically send back the following data from MIDI OUT.
F0 41 10 46 12 00 00 10 12 3C 22 F7

You will notice that the Chorus Level is 3C (60).

Check sum
The error checking process uses a checksum and provides a bit pattern where the last significant 7 bits are zero, when values for an address, data (or size) and the checksum are summed.

< Example >
F0 41 10 46 12 00 00 10 0D 06 5D F7

[80H – {(00H + 00H + 10H + 0DH + 06H) & 7FH }] & 7F = 5DH
Address data

1. Sound Expansion Series <MODEL ID = 46H>

* 1 - 1 System Common

Address		Description	
00 00 00 00	0000 000a	Panel mode	0 — 1 (PERFORMANCE, PATCH)
00 00 00 01	0aaa aaaa	Master tune	1 — 127 (427.4 — 452.6)
%00 00 00 02	0aaa aaaa	Key transpose	28 — 100
%00 00 00 03	0000 000a	Transpose Switch	0 — 1
00 00 00 04	0000 000a	Reverb switch	0 — 1 (OFF, ON)
00 00 00 05	0000 000a	Chorus switch	0 — 1 (OFF, ON)
%00 00 00 06	0000 000a	Hold polarity	0 — 1
%00 00 00 07	0000 000a	Pedal 1 polarity	0 — 1
%00 00 00 08	0000 00aa	Pedal 1 mode	0 — 3
%00 00 00 09	0aaa aaaa	Pedal 1 assign	0 — 100
%00 00 00 0A	0000 000a	Pedal 2 polarity	0 — 1
%00 00 00 0B	0000 00aa	Pedal 2 mode	0 — 3
%00 00 00 0C	0aaa aaaa	Pedal 2 assign	0 — 100
%00 00 00 0D	0000 00aa	C1 mode	0 — 3
%00 00 00 0E	0aaa aaaa	C1 assign	0 — 100
%00 00 00 0F	0aaa aaaa	Aftertouch threshold	0 — 127
		MIDI receive switch	
00 00 00 10	0000 000a	Volume	0 — 1 (OFF, ON)
00 00 00 11	0000 000a	Control change	0 — 1 (OFF, ON)
00 00 00 12	0000 000a	Channel pressure	0 — 1 (OFF, ON)
00 00 00 13	0000 000a	Modulation	0 — 1 (OFF, ON)
00 00 00 14	0000 000a	Pitch bend	0 — 1 (OFF, ON)
00 00 00 15	0000 000a	Program change	0 — 1 (OFF, ON)
00 00 00 16	0000 000a	Bank select	0 — 1 (OFF, ON)
		MIDI transmit switch	
%00 00 00 17	0000 000a	Volume	0 — 1
%00 00 00 18	0000 000a	Control change	0 — 1
%00 00 00 19	0000 000a	Channel pressure	0 — 1
%00 00 00 1A	0000 000a	Modulation	0 — 1
%00 00 00 1B	0000 000a	Bender	0 — 1
%00 00 00 1C	0000 000a	Program change	0 — 1
%00 00 00 1D	0000 000a	Bank select	0 — 1
00 00 00 1E	0000 aaaa	Patch receive channel	0 — 15 (1 — 16)
%00 00 00 1F	000a aaaa	Patch transmit channel	0 — 17
00 00 00 20	000a aaaa	Control channel	0 — 16 (1 — 16, OFF)
%00 00 00 21	0000 000a	Output mode	0 — 1 (OUT2, OUT4)
%00 00 00 22	0000 000a	Rhythm edit key	0 — 1 (INT&MIDI, INT)
00 00 00 23	0000 000a	Scale tune switch	0 — 1 (OFF, ON)
00 00 00 24	0aaa aaaa	Scale Tune Part1 C	0 — 127 (–64 — +63)
00 00 00 25	:	: G#	
00 00 00 26	:	: D	
00 00 00 27	:	: D#	
00 00 00 28	:	: E	
00 00 00 29	:	: F	
00 00 00 2A	:	: F#	
00 00 00 2B	:	: G	
00 00 00 2C	:	: G#	
00 00 00 2D	:	: A	
00 00 00 2E	:	: A#	
00 00 00 2F	:	: B	
00 00 00 30	0aaa aaaa	Scale Tune Part2 C	0 — 127 (–64 — +63)
	:	:	
00 00 00 3B	:	: B	
00 00 00 3C	0aaa aaaa	Scale Tune Part3 C	0 — 127 (–64 — +63)
	:	:	
00 00 00 47	:	: B	
00 00 00 48	0aaa aaaa	Scale Tune Part4 C	0 — 127 (–64 — +63)
	:	:	
00 00 00 53	:	: B	
00 00 00 54	0aaa aaaa	Scale Tune Part5 C	0 — 127 (–64 — +63)
	:	:	
00 00 00 5F	:	: B	
00 00 00 60	0aaa aaaa	Scale Tune Part6 C	0 — 127 (–64 — +63)
	:	:	
00 00 00 6B	:	: B	
00 00 00 6C	0aaa aaaa	Scale Tune Part7 C	0 — 127 (–64 — +63)
	:	:	
00 00 00 77	:	: B	
00 00 00 78	0aaa aaaa	Scale Tune Part8 C	0 — 127 (–64 — +63)
	:	:	
00 00 01 03	:	: B	
00 00 01 04	0aaa aaaa	Scale Tune Patch C	0 — 127 (–64 — +63)
	:	:	
00 00 01 0F	:	: B	
00 00 01 10	0— —	(Dummy)	
00 00 01 11	0aaa aaaa	Master volume	0 — 127
Total Size	00 00 01 12		

1-2 Performance

1-2-1 Performance Common

Address		Description	
00 00 10 00	0aaa aaaa	Performance name 1	32 — 127
00 00 10 01	0aaa aaaa	Performance name 2	32 — 127
00 00 10 0B	0aaa aaaa	Performance name 12	32 — 127
00 00 10 0D	0000 0aaa	Reverb type	0 — 7 (ROOM1, ROOM2, STAGE1, STAGE2, HALL1, HALL2, DELAY, PAN-DLY)
00 00 10 0E	0aaa aaaa	Reverb level	0 — 127
00 00 10 0F	0aaa aaaa	Reverb time	0 — 127
00 00 10 10	0aaa aaaa	Reverb feedback	0 — 127
00 00 10 11	0000 00aa	Chorus type	0 — 2 (CHORUS1, CHORUS2, CHORUS3)
00 00 10 12	0aaa aaaa	Chorus level	0 — 127
00 00 10 13	0aaa aaaa	Chorus depth	0 — 127
00 00 10 14	0aaa aaaa	Chorus rate	0 — 127
00 00 10 15	0aaa aaaa	Chorus feedback	0 — 127
00 00 10 16	0000 000a	Chorus output	0 — 1 (OUTPUT, REV) If this parameter set to "OUTPUT," chorus signal send to "Output." If this parameter set to "REV," chorus signal send to reverb.
00 00 10 17	000a aaaa	Part 1 Voice assign	0 — 28
00 00 10 18	000a aaaa	Part 2 Voice assign	0 — 28
00 00 10 1E	000a aaaa	Part 8 Voice assign	0 — 28
Total Size	00 00 00 1F		

Note: The sum of Voice reserves must be less than or equal to 28

1-2-2 Performance Part

00 00 1x dd
x = 08H — 0FH (Part1 — part8), dd = Description

Address		Description	
%00 00 1x 00	0000 000a	Transmit switch	0 — 1
%00 00 1x 01	0000 aaaa	Transmit channel	0 — 15
%00 00 1x 02	0000 aaaa 0000 bbbb	Transmit program change	0 — 128
%00 00 1x 04	0000 aaaa 0000 bbbb	Transmit volume	0 — 128
%00 00 1x 06	0000 aaaa 0000 bbbb	Transmit pan	0 — 128
%00 00 1x 08	0aaa aaaa	Transmit key range lower	0 — 127
%00 00 1x 09	0aaa aaaa	Transmit key range upper	0 — 127
%00 00 1x 0A	0aaa aaaa	Transmit key transpose	28 — 100
%00 00 1x 0B	0aaa aaaa	Transmit velocity sense	1 — 127
%00 00 1x 0C	0aaa aaaa	Transmit velocity max	0 — 127
%00 00 1x 0D	0000 0aaa	Transmit velocity curve	0 — 6
%00 00 1x 0E	0000 000a	Internal switch	0 — 1
%00 00 1x 0F	0aaa aaaa	Internal key range lower	0 — 127
%00 00 1x 10	0aaa aaaa	Internal key range upper	0 — 127
%00 00 1x 11	0aaa aaaa	Internal key transpose	28 — 100
%00 00 1x 12	0aaa aaaa	Internal velocity sense	1 — 127
%00 00 1x 13	0aaa aaaa	Internal velocity max	0 — 127

%00 00 1x 14	0000 0aaa	Internal velocity curve	0 — 6
00 00 1x 15	0000 000a	Receive switch	0 — 1 (OFF, ON)
00 00 1x 16	0000 aaaa	Receive channel	0 — 15 (1 — 16)
#00 00 1x 17	0000 aaaa	Patch number	0 — 254
	0000 bbbb		
00 00 1x 19	0aaa aaaa	Part level	0 — 127
00 00 1x 1A	0aaa aaaa	Part pan	0 — 127 (L64 — 63R)
00 00 1x 1B	0aaa aaaa	Part coarse tune	16 — 112 (–48 — +48)
00 00 1x 1C	0aaa aaaa	Part fine tune	14 — 114 (–50 — +50)
00 00 1x 1D	0000 000a	Reverb switch	0 — 1 (OFF, ON)
00 00 1x 1E	0000 000a	Chorus switch	0 — 1 (OFF, ON)
00 00 1x 1F	0000 000a	Receive program change	0 — 1 (OFF, ON)
00 00 1x 20	0000 000a	Receive volume	0 — 1 (OFF, ON)
00 00 1x 21	0000 000a	Receive hold-1	0 — 1 (OFF, ON)
%00 00 1x 22	0000 00aa	Output select	0 — 2 (MN, SB, PAT)
%00 00 1x 23	0000 00aa	Patch media	2 (EXP)
%00 00 1x 24	0000 000a	Sequencer switch	0 — 1 (ON, OFF)
Total Size	00 00 00 25		

Note: The value of the Transmit key range upper must be greater than or equal to the Transmit key range lower.
Note: The value of the Internal key range upper must be greater than or equal to the Internal key range lower.

* 1-3 Patch

00 0s 2y dd
0s = 00H — 06H (Performance Mode Temporary patch)
08H (Patch Mode Temporary patch)
dd = Description

* 1-3-1 Patch Common

Address		Description	
00 0s 20 00	0aaa aaaa	Patch name 1	32 — 127
00 0s 20 01	0aaa aaaa	Patch name 2	32 — 127
00 0s 20 0B	0aaa aaaa	Patch name 12	32 — 127
00 0s 20 0C	0000 000a	Velocity switch	0 — 1 (OFF, ON)
00 0s 20 0D	0000 0aaa	Reverb type	0 — 7 (ROOM1, ROOM2, STAGE1, STAGE2, HALL1, HALL2, DELAY, PAN-DLY)
00 0s 20 0E	0aaa aaaa	Reverb level	0 — 127
00 0s 20 0F	0aaa aaaa	Reverb time	0 — 127
00 0s 20 10	0aaa aaaa	Delay feedback	0 — 127
00 0s 20 11	0000 00aa	Chorus type	0 — 2 (CHORUS1, CHORUS2, CHORUS3)
00 0s 20 12	0aaa aaaa	Chorus level	0 — 127
00 0s 20 13	0aaa aaaa	Chorus depth	0 — 127
00 0s 20 14	0aaa aaaa	Chorus rate	0 — 127
00 0s 20 15	0aaa aaaa	Chorus feedback	0 — 127
00 0s 20 16	0000 000a	Chorus output	0 — 1 (OUTPUT, REV) If this parameter set to "OUTPUT," chorus signal send to "Output." If this parameter set to "REV," chorus signal send to reverb.
00 0s 20 17	0aaa aaaa	Analog feel	0 — 127
00 0s 20 18	0aaa aaaa	Patch level	0 — 127
00 0s 20 19	0aaa aaaa	Patch pan	0 — 127 (L64 — 63R)
00 0s 20 1A	0aaa aaaa	Bender range down	16 — 64 (–48 — 0)
00 0s 20 1B	0000 aaaa	Bender range up	0 — 12
00 0s 20 1C	0000 000a	Key assign	0 — 1 (POLY, SOLO)
00 0s 20 1D	0000 000a	Solo legato	0 — 1 (OFF, ON)
00 0s 20 1E	0000 000a	Portamento switch	0 — 1 (OFF, ON)
00 0s 20 1F	0000 000a	Portamento mode	0 — 1 (LEGATO, NORMAL)
00 0s 20 20	0000 000a	Portamento type	0 — 1 (TIME, RATE)
00 0s 20 21	0aaa aaaa	Portamento time	0 — 127
Total Size	00 00 00 22		

* 1-3-2 Patch Tone

y = 08H — 0BH (Patch Tone 1 — Patch Tone 4)

Address		Description	
%00 0s 2y 00	0000 00aa	Wave group	1 (EXP)
#00 0s 2y 01	0000 aaaa	Wave number	0 — 254
	0000 bbbb		(1 — 255)
00 0s 2y 03	0000 000a	Tone switch	0 — 1 (OFF, ON)
00 0s 2y 04	0000 000a	FXM switch	0 — 1 (OFF, ON)
00 0s 2y 05	0000 aaaa	FXM depth	0 — 15 (1 — 16)
00 0s 2y 06	0aaa aaaa	Velocity range lower	0 — 127
00 0s 2y 07	0aaa aaaa	Velocity range upper	0 — 127
	(Turn "On" the Velocity switch of the Patch common parameters to make "Velocity Range" work.)		
00 0s 2y 08	0000 000a	Volume switch	0 — 1 (OFF, ON)
00 0s 2y 09	0000 000a	Hold-1 switch	0 — 1 (OFF, ON)
00 0s 2y 0A	0000 aaaa	Modulation 1 destination	0 — 12 (*1)
00 0s 2y 0B	0aaa aaaa	Modulation 1 depth	1 — 127 (–63 — +63)
00 0s 2y 0C	0000 aaaa	Modulation 2 destination	0 — 12 (*1)
00 0s 2y 0D	0aaa aaaa	Modulation 2 depth	1 — 127 (–63 — +63)
00 0s 2y 0E	0000 aaaa	Modulation 3 destination	0 — 12 (*1)
00 0s 2y 0F	0aaa aaaa	Modulation 3 depth	1 — 127 (–63 — +63)
00 0s 2y 10	0000 aaaa	Modulation 4 destination	0 — 12 (*1)
00 0s 2y 11	0aaa aaaa	Modulation 4 depth	1 — 127 (–63 — +63)
00 0s 2y 12	0000 aaaa	Aftertouch 1 destination	0 — 12 (*1)
00 0s 2y 13	0aaa aaaa	Aftertouch 1 depth	1 — 127 (–63 — +63)
00 0s 2y 14	0000 aaaa	Aftertouch 2 destination	0 — 12 (*1)
00 0s 2y 15	0aaa aaaa	Aftertouch 2 depth	1 — 127 (–63 — +63)
00 0s 2y 16	0000 aaaa	Aftertouch 3 destination	0 — 12 (*1)
00 0s 2y 17	0aaa aaaa	Aftertouch 3 depth	1 — 127 (–63 — +63)
00 0s 2y 18	0000 aaaa	Aftertouch 4 destination	0 — 12 (*1)
00 0s 2y 19	0aaa aaaa	Aftertouch 4 depth	1 — 127 (–63 — +63)
00 0s 2y 1A	0000 aaaa	Expression 1 destination	0 — 12 (*1)
00 0s 2y 1B	0aaa aaaa	Expression 1 depth	1 — 127 (–63 — +63)
00 0s 2y 1C	0000 aaaa	Expression 2 destination	0 — 12 (*1)
00 0s 2y 1D	0aaa aaaa	Expression 2 depth	1 — 127 (–63 — +63)
00 0s 2y 1E	0000 aaaa	Expression 3 destination	0 — 12 (*1)
00 0s 2y 1F	0aaa aaaa	Expression 3 depth	1 — 127 (–63 — +63)
00 0s 2y 20	0000 aaaa	Expression 4 destination	0 — 12 (*1)
00 0s 2y 21	0aaa aaaa	Expression 4 depth	1 — 127 (–63 — +63)
(1) 0 to 12 of (1) refer to the followings (OFF, PITCH, CUTOFF, RESONANCE, LEVEL, PITCH LFO1, PITCH LFO2, TVF LFO1, TVF LFO2, TVA LFO1,TVA LFO2, LFO1 RATE, LFO2 RATE)			
00 0s 2y 22	0000 0aaa	LFO-1 form	0 — 5 (TRI, SIN, SAW, SQR, RND1, RND2)
00 0s 2y 23	0000 0aaa	LFO-1 offset	0 — 4 (–100, -50, 0, +50, +100)
00 0s 2y 24	0000 000a	LFO-1 synchro	0 — 1 (OFF, ON)
00 0s 2y 25	0aaa aaaa	LFO-1 rate	0 — 127
#00 0s 2y 26	0000 aaaa	LFO-1 delay	0 — 128
	0000 bbbb		(0 — 127, KEY-OFF)
00 0s 2y 28	0000 000a	LFO-1 fade polarity	0 — 1 (IN, OUT)
00 0s 2y 29	0aaa aaaa	LFO-1 fade time	0 — 127
00 0s 2y 2A	0aaa aaaa	LFO-1 pitch depth	1 — 127 (–63 — +63)
00 0s 2y 2B	0aaa aaaa	LFO-1 TVF depth	1 — 127 (–63 — +63)
00 0s 2y 2C	0aaa aaaa	LFO-1 TVA depth	1 — 127 (–63 — +63)
00 0s 2y 2D	0000 0aaa	LFO-2 form	0 — 5 (TRI, SIN, SAW, SQR, RND1, RND2)
00 0s 2y 2E	0000 0aaa	LFO-2 offset	0 — 4 (–100, -50, 0, +50, +100)
00 0s 2y 2F	0000 000a	LFO-2 synchro	0 — 1 (OFF, ON)
00 0s 2y 30	0aaa aaaa	LFO-2 rate	0 — 127
#00 0s 2y 31	0000 aaaa	LFO-2 delay	0 — 128
	0000 bbbb		(0 — 127, KEY-OFF)
00 0s 2y 33	0000 000a	LFO-2 fade polarity	0 — 1 (IN, OUT)
00 0s 2y 34	0aaa aaaa	LFO-2 fade time	0 — 127
00 0s 2y 35	0aaa aaaa	LFO-2 pitch depth	1 — 127 (–63 — +63)
00 0s 2y 36	0aaa aaaa	LFO-2 TVF depth	1 — 127 (–63 — +63)
00 0s 2y 37	0aaa aaaa	LFO-2 TVA depth	1 — 127 (–63 — +63)
00 0s 2y 38	0aaa aaaa	Pitch coarse	16 — 112 (–48 — +48)
00 0s 2y 39	0aaa aaaa	Pitch fine	14 — 114 (–50 — +50)
00 0s 2y 3A	0000 aaaa	Random pitch	0 — 15 (0, 5, 10, 20, 30, 40, 50, 70, 100, 200, 300, 400, 500, 600, 800, 1200)
00 0s 2y 3B	0000 aaaa	Pitch key follow	0 — 15 (–100, -70, -50, -30, -10, 0, +10, +20, +30, +40, +50, +70, +100, +120, +150, +200)
00 0s 2y 3C	0aaa aaaa	P-ENV velocity sense	1 — 127 (–63 — +63)
00 0s 2y 3D	0000 aaaa	P-ENV T1 velocity	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 3E	0000 aaaa	P-ENV T4 velocity	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 3F	0000 aaaa	P-ENV time key follow	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 40	0aaa aaaa	P-ENV depth	52 — 76 (–12 — +12)
00 0s 2y 41	0aaa aaaa	P-ENV time 1	0 — 127
00 0s 2y 42	0aaa aaaa	P-ENV level 1	1 — 127 (–63 — +63)
00 0s 2y 43	0aaa aaaa	P-ENV time 2	0 — 127
00 0s 2y 44	0aaa aaaa	P-ENV level 2	1 — 127 (–63 — +63)
00 0s 2y 45	0aaa aaaa	P-ENV time 3	0 — 127
00 0s 2y 46	0aaa aaaa	P-ENV level 3	1 — 127 (–63 — +63)
00 0s 2y 47	0aaa aaaa	P-ENV time 4	0 — 127
00 0s 2y 48	0aaa aaaa	P-ENV level 4	1 — 127 (–63 — +63)
00 0s 2y 49	0000 00aa	TVF mode	0 — 2 (OFF, LPF, HPF)
00 0s 2y 4A	0aaa aaaa	Cutoff frequency	0 — 127
00 0s 2y 4B	0aaa aaaa	Resonance	0 — 127
00 0s 2y 4C	0000 000a	Resonance mode	0 — 1 (SOFT, HARD)
00 0s 2y 4D	0000 aaaa	TVF key follow	0 — 15 (–100, -70, -50, -30, -10, 0, +10, +20, +30, +40, +50, +70, +100, +120, +150, +200)
00 0s 2y 4E	0000 0aaa	TVF-ENV velocity curve	0 — 6 (1 — 7)
00 0s 2y 4F	0aaa aaaa	TVF-ENV velocity sense	1 — 127 (–63 — +63)
00 0s 2y 50	0000 aaaa	TVF-ENV T1 velocity	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 51	0000 aaaa	TVF-ENV T4 velocity	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)

00 0s 2y 52	0000 aaaa	TVF-ENV time key follow	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 53	0aaa aaaa	TVF-ENV depth	1 — 127 (–63 — +63)
00 0s 2y 54	0aaa aaaa	TVF-ENV time 1	0 — 127
00 0s 2y 55	0aaa aaaa	TVF-ENV level 1	0 — 127
00 0s 2y 56	0aaa aaaa	TVF-ENV time 2	0 — 127
00 0s 2y 57	0aaa aaaa	TVF-ENV level 2	0 — 127
00 0s 2y 58	0aaa aaaa	TVF-ENV time 3	0 — 127
00 0s 2y 59	0aaa aaaa	TVF-ENV level 3	0 — 127
00 0s 2y 5A	0aaa aaaa	TVF-ENV time 4	0 — 127
00 0s 2y 5B	0aaa aaaa	TVF-ENV level 4	0 — 127
00 0s 2y 5C	0aaa aaaa	Level	0 — 127
00 0s 2y 5D	0000 aaaa	TVA key follow	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
#00 0s 2y 5E	0000 aaaa	Pan	0 — 128
	0000 bbbb		(L64 — 63R, RND)
00 0s 2y 60	0000 aaaa	Panning key follow	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 61	0000 00aa	TVA delay mode	0 — 2 (NORMAL, HOLD, PLAY-MATE)
#00 0s 2y 62	0000 aaaa	TVA delay time	0 — 128
	0000 bbbb		(0 — 127, KEY-OFF)
00 0s 2y 64	0000 0aaa	TVA-ENV velocity curve	0 — 6 (1 — 7)
00 0s 2y 65	0aaa aaaa	TVA-ENV velocity sense	1 — 127 (–63 — +63)
00 0s 2y 66	0000 aaaa	TVA-ENV T1 velocity	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 67	0000 aaaa	TVA-ENV T4 velocity	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 68	0000 aaaa	TVA-ENV time key follow	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 0s 2y 69	0aaa aaaa	TVA-ENV time 1	0 — 127
00 0s 2y 6A	0aaa aaaa	TVA-ENV level 1	0 — 127
00 0s 2y 6B	0aaa aaaa	TVA-ENV time 2	0 — 127
00 0s 2y 6C	0aaa aaaa	TVA-ENV level 2	0 — 127
00 0s 2y 6D	0aaa aaaa	TVA-ENV time 3	0 — 127
00 0s 2y 6E	0aaa aaaa	TVA-ENV level 3	0 — 127
00 0s 2y 6F	0aaa aaaa	TVA-ENV time 4	0 — 127
00 0s 2y 70	0aaa aaaa	Dry level	0 — 127
00 0s 2y 71	0aaa aaaa	Reverb send level	0 — 127
00 0s 2y 72	0aaa aaaa	Chorus send level	0 — 127
%00 0s 2y 73	0000 000a	Output select	0 — 1 (MAIN, SUB)
00 0s 2y 74	0000 000a	Redamper switch	0 — 1 (OFF, ON)
Total Size	00 00 00 75		

The values of the Velocity Range Upper must be greater than or equal to the values of Velocity Range Lower.

* 1-4 Rhythm Setup 1

00 mm rr cc
mm = 07
rr = 40H — 7CH (Note #36 — Note #96)
cc = Description

* 1-4-1 Rhythm Note 1

Address		Description	
00 mm rr 00	0000 00aa	Wave group	1 (EXP)
#00 mm rr 01	0000 aaaa	Wave number	0 — 254
0000 bbbb	(1 — 255)		
00 mm rr 03	0000 000a	Tone switch	0 — 1 (OFF, ON)
00 mm rr 04	0aaa aaaa	Coarse tune	0 — 127 (C-1 — G9)
00 mm rr 05	000a aaaa	Mute group	0 — 31 (OFF, 1 — 31)
00 mm rr 06	0000 000a	Envelope mode	0 — 1 (NO-SUSTAIN, SUSTAIN)
00 mm rr 07	0aaa aaaa	Pitch fine	14 — 114 (–50 — +50)
00 mm rr 08	0000 aaaa	Random pitch	0 — 15 (0, 5, 10, 20, 30, 40, 50, 70, 100, 200, 300, 400, 500, 600, 800, 1200)
00 mm rr 09	0000 aaaa	Bender range	0 — 12
00 mm rr 0A	0aaa aaaa	P-ENV velocity sense	1 — 127 (–63 — +63)
00 mm rr 0B	0000 aaaa	P-ENV time velocity sense	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 mm rr 0C	0aaa aaaa	P-ENV depth	52 — 76 (–12 — +12)
00 mm rr 0D	0aaa aaaa	P-ENV time 1	0 — 127
00 mm rr 0E	0aaa aaaa	P-ENV level 1	1 — 127 (–63 — +63)
00 mm rr 0F	0aaa aaaa	P-ENV time 2	0 — 127
00 mm rr 10	0aaa aaaa	P-ENV level 2	1 — 127 (–63 — +63)
00 mm rr 11	0aaa aaaa	P-ENV time 3	0 — 127
00 mm rr 12	0aaa aaaa	P-ENV level 3	1 — 127 (–63 — +63)
00 mm rr 13	0aaa aaaa	P-ENV time 4	0 — 127
00 mm rr 14	0aaa aaaa	P-ENV level 4	1 — 127 (–63 — +63)
00 mm rr 15	0000 00aa	TVF mode	0 — 2 (OFF, LPF, HPF)
00 mm rr 16	0aaa aaaa	Cutoff frequency	0 — 127
00 mm rr 17	0aaa aaaa	Resonance	0 — 127
00 mm rr 18	0000 000a	Resonance mode	0 — 1 (SOFT, HARD)
00 mm rr 19	0aaa aaaa	TVF-ENV velocity sense	1 — 127 (–63 — +63)
00 mm rr 1A	0000 aaaa	TVF-ENV time velocity sense	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 mm rr 1B	0aaa aaaa	TVF-ENV depth	1 — 127 (–63 — +63)
00 mm rr 1C	0aaa aaaa	TVF-ENV time 1	0 — 127
00 mm rr 1D	0aaa aaaa	TVF-ENV level 1	0 — 127
00 mm rr 1E	0aaa aaaa	TVF-ENV time 2	0 — 127
00 mm rr 1F	0aaa aaaa	TVF-ENV level 2	0 — 127
00 mm rr 20	0aaa aaaa	TVF-ENV time 3	0 — 127
00 mm rr 21	0aaa aaaa	TVF-ENV level 3	0 — 127
00 mm rr 22	0aaa aaaa	TVF-ENV time 4	0 — 127
00 mm rr 23	0aaa aaaa	TVF-ENV level 4	0 — 127
00 mm rr 24	0aaa aaaa	Level	0 — 127
#00 mm rr 25	0000 aaaa	Pan	0 — 128
0000 bbbb	(L64 — 63R, RND)		
00 mm rr 27	0aaa aaaa	TVA-ENV velocity sense	1 — 127 (–63 — +63)
00 mm rr 28	0000 aaaa	TVA-ENV time velocity sense	0 — 14 (–100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 mm rr 29	0aaa aaaa	TVA-ENV time 1	0 — 127
00 mm rr 2A	0aaa aaaa	TVA-ENV level 1	0 — 127
00 mm rr 2B	0aaa aaaa	TVA-ENV time 2	0 — 127
00 mm rr 2C	0aaa aaaa	TVA-ENV level 2	0 — 127
00 mm rr 2D	0aaa aaaa	TVA-ENV time 3	0 — 127
00 mm rr 2E	0aaa aaaa	TVA-ENV level 3	0 — 127
00 mm rr 2F	0aaa aaaa	TVA-ENV time 4	0 — 127
00 mm rr 30	0aaa aaaa	Dry level	0 — 127
00 mm rr 31	0aaa aaaa	Reverb send level	0 — 127
00 mm rr 32	0aaa aaaa	Chorus send level	0 — 127
%00 mm rr 33	0000 000a	Output select	0 — 1 (MAIN, SUB)
Total Size	00 00 00 34		

* 1-5 Rhythm Setup 2

00 mm rr cc
mm = 20
rr = 38H — 3FH (Note #28 — Note #35)
= 40H — 46H (Note #97 — Note #103)
cc = Description

* 1-5-1 Rhythm Note 2

Same as 1-4-1.

2 GS

< MODEL ID = 42H >

2-1 Scale Tune

w = 0 — 7 (Scale tune Part8,1,2,...,7)

Address		Description	
40 1w 40	0aaa aaaa	Scale Tune C	00 — 127 (–64 — +63)
40 1w 41	:	: C#	
40 1w 42	:	: D	
40 1w 43	:	: D#	
40 1w 44	:	: E	
40 1w 45	:	: F	
40 1w 46	:	: F#	
40 1w 47	:	: G	
40 1w 48	:	: G#	
40 1w 49	:	: A	
40 1w 4A	:	: A#	
40 1w 4B	:	: B	
Total Size	00 00 0C		

Note: If you send the Scale Tune data, must send from "C" to "B" (1 oct) per packet.

/ Example of DT1 application /

To set the tune (C — B) of the performance part 1 Arabia, send the data as follow:
F0H 41H 10H 42H 12H 40H 11H 40H 3AH 6DH 3EH 34H 0DH 38H 6BH 3CH 6FH 40H 36H 0FH 50H F7H

Table A-1: Decimal to Hexadecimal

The MIDI message are expressed in hexadecimal configured in 7 bits.
This table is useful when you read or write MIDI messages.

(D) = decimal
(H) = Hexadecimal

(D)	(H)	(D)	(H)	(D)	(H)	(D)	(H)
0	00H	32	20H	64	40H	96	60H
1	01H	33	21H	65	41H	97	61H
2	02H	34	22H	66	42H	98	62H
3	03H	35	23H	67	43H	99	63H
4	04H	36	24H	68	44H	100	64H
5	05H	37	25H	69	45H	101	65H
6	06H	38	26H	70	46H	102	66H
7	07H	39	27H	71	47H	103	67H
8	08H	40	28H	72	48H	104	68H
9	09H	41	29H	73	49H	105	69H
10	0AH	42	2AH	74	4AH	106	6AH
11	0BH	43	2BH	75	4BH	107	6BH
12	0CH	44	2CH	76	4CH	108	6CH
13	0DH	45	2DH	77	4DH	109	6DH
14	0EH	46	2EH	78	4EH	110	6EH
15	0FH	47	2FH	79	4FH	111	6FH
16	10H	48	30H	80	50H	112	70H
17	11H	49	31H	81	51H	113	71H
18	12H	50	32H	82	52H	114	72H
19	13H	51	33H	83	53H	115	73H
20	14H	52	34H	84	54H	116	74H
21	15H	53	35H	85	55H	117	75H
22	16H	54	36H	86	56H	118	76H
23	17H	55	37H	87	57H	119	77H
24	18H	56	38H	88	58H	120	78H
25	19H	57	39H	89	59H	121	79H
26	1AH	58	3AH	90	5AH	122	7AH
27	1BH	69	3BH	91	5BH	123	7BH
28	1CH	60	3CH	92	5CH	124	7CH
29	1DH	61	3DH	93	5DH	125	7DH
30	1EH	62	3EH	94	5EH	126	7EH
31	1FH	63	3FH	95	5FH	127	7FH

The decimal value of MIDI channel, Program change, etc is the decimal number in the table plus 1.
In the hexadecimal notation in configured 7 bits, the maximum data of 1 byte is 128. If the data is mode than 128,used plural bytes.
The signed value is 00H = –64, 40H = 0, 7FH = +63. In decimal notation,the value is the decimal number in the table minus 64.
The signed value of dual bytes is 00 00H = –8192, 40 40H = 0, 7F 7FH =8191. For example,converted aaH bbH (hex) to decimal to the following: aa bbH — 40 00H = aa x 128 + bb –64 x 128

Table A-2: ASCII code

Patch Name and Performance Name of MIDI data are described the ASCII code in the table below.

(H) = hexadecimal

Character	(H)	Character	(H)	Character	(H)	Character	(H)
(Space)	20H						
A	41H	Q	51H	j	6AH	1	31H
B	42H	R	52H	k	6BH	2	32H
C	43H	S	53H	l	6CH	3	33H
D	44H	T	54H	m	6DH	4	34H
E	45H	U	55H	n	6EH	5	35H
F	46H	V	56H	o	6FH	6	36H
G	47H	W	57H	p	70H	7	37H
H	48H	Y	59H	q	71H	8	38H
I	49H	Z	5AH	r	72H	9	39H
J	4AH	a	61H	s	73H	0	30H
K	4BH	b	62H	t	74H	+	2BH
L	4CH	c	63H	u	75H	-	2DH
M	4DH	d	64H	v	76H	*	2AH
N	4EH	e	65H	w	77H	/	2FH
O	4FH	f	66H	x	78H	#	23H
P	50H	g	67H	y	79H	!	21H
		h	68H	z	7AH	,	2CH
				i	69H	.	2EH

SOUND MODULE
Model
Sound Expansion Series

MIDI Implementation Chart

Date : Feb. 22, 1995
Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic	Default	X	1 — 16	
Channel	Changed	X	1 — 16	Memorized
Mode	Default	X	Mode 3	
	Messages	X	Mode 3, 4 (M = 1)	
	Altered	**********		
Note Number :		X	0 — 127	
	True Voice	**********	0 — 127	
Velocity	Note ON	X	O	
	Note OFF	X	O	
After Touch	Key's	X	X	
	Ch's	X	O	
Pitch Bend		X	O	Resolution: 9 bits
Control Change	0, 32	X	O *1	Bank select
	1	X	O *2	Modulation
	5	X	O *2	Portamento time
	6, 38	X	O *2	Data entry
	7	X	O *1	Volume
	10	X	O *2	Panpot
	11	X	O *2	Expression
	64	X	O *1	Hold 1
	65	X	O *2	Portamento
	66	X	O *2	Sostenuto
	67	X	O *2	Soft
	91	X	O *2	Reverb
	93	X	O *2	Chorus
	98, 99	X	O *1	NRPN LSB, MSB
	100, 101	X	O *2	RPN LSB, MSB
Prog Change		X	O *1	
	: True #	**********	0 — 127	
System Exclusive		O	O	
System Common	: Song Pos	X	X	
	: Song Sel	X	X	
	: Tune	X	X	
System Real Time	: Clock	X	X	
	: Commands	X	X	
Aux Message	: All Sound Off	X	O	
	: Reset All Controllers	X	O	
	: Local ON/OFF	X	X	
	: All Notes Off	X	O (123 — 127)	
	: Active Sense	O	O	
	: Reset	X	X	
Notes		* 1 O X is selectable * 2 O X is selectable using external MIDI device		

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO O : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO X : No